

the need is most acute. The World Health Organization (WHO) “estimates that the WHO African Region has a shortfall of 817,992 doctors, nurses, and midwives, which means a need to more than double the workforce among these professional categories.”² The issue of scarcity of trained professional staff becomes especially problematic in the context of expanding ART services; staffing requirements for ART are often equal to a third or more of current staff for *all* public health services in a country. Without appropriate planning, scaling up ART in resource poor environments can place tremendous strains on laboratory, pharmaceutical, and physician capacity.

The WHO estimates that Uganda has only one doctor for every 22,000 patients and an overall health worker deficit of up to 80 percent. The expansion of HIV treatment has highlighted the shortage of medical doctors and other health workers trained to deliver HIV care and treatment with ART. The Government of Uganda has adopted a decentralized approach to scaling up ART in its National ART Plan³ and is actively exploring and testing initiatives to enhance the role of non-physician clinicians in the delivery of HIV care and treatment. A recent Ugandan study found that 64 percent of people who prescribed ART were clinical officers, nurses, or midwives—41 percent and 64 percent of whom had not been trained in initiating ART or monitoring ART, respectively.⁴ As care and treatment with ART expands, government and other stakeholders need to understand and plan for training the human resources associated with this expansion.

The Health Sector Strategic Plan II (HSSP II) is the government’s roadmap for health sector investments from 2006–2010. The HSSP II explicitly identifies the shortfall in human resources as a major constraint in achieving its targets: *Availability of trained health workers is perhaps the most critical limiting factor for the delivery of the minimum package.*⁵ In recognition of this constraint, the HSSP II revised its targets for minimum staffing by trained providers *downward* from 75 percent under HSSP I to 52 percent of health facilities. In addition to sector-wide gaps in trained personnel and disparities in staffing patterns, the Ministry of Health (MOH) has also identified gaps in personnel trained and available to provide HIV services.

Several approaches have been taken to understand the impact of human resource constraints on scaling up treatment and care services in Uganda. Some approaches included evaluating task-shifting models to understand the feasibility and cost savings from small scale experiments, while others focused on examining the costs of scaling up the package of required services based on MOH staffing guidelines. Another possible approach for planners within the Human Resource Division and National AIDS Council is to understand the extent to which supply of workers by cadre must increase to meet national targets for HIV. This approach is made possible by applying the Capacity Module of the Goals Model to estimate resource requirements in HIV.

The Capacity Module

The Capacity Module, an Excel-based spreadsheet, estimates the human resources required to implement prevention, care, treatment, and mitigation interventions to effectively reach a specified number of individuals with each intervention. The Capacity Module was developed in conjunction with the Goals Model, a strategic planning model that examines resource allocation among HIV/AIDS interventions. The Goals Model develops estimates or outputs on numbers of clients who will need to be reached based on inputs on the country-specific epidemiology of HIV and AIDS, the resources available, and the allocation of resources to specific interventions to maximize impact of these interventions within the existing resource envelope. The Capacity Module draws on these *outputs* of the Goals Model in terms of the specific coverage obtained or numbers of persons reached from decisions on resource allocations across

² WHO. 2007. *Task Shifting to Tackle Health Worker Shortages*. Geneva: WHO. Available at http://www.who.int/healthsystems/task_shifting_booklet.pdf [accessed April 10, 2010]. Page 3.

³ MOH. 2003. *Antiretroviral Treatment Policy for Uganda*. Kampala: MOH.

⁴ Lutalo, I. et al. 2009. “Training Needs Assessment for Clinicians at Antiretroviral Therapy Clinics: Evidence from a National Survey in Uganda.” *Human Resources for Health* 7: 76. Available at <http://www.human-resources-health.com/content/pdf/1478-4491-7-76.pdf> [accessed April 10, 2010].

⁵ MOH. 2006. *Health Sector Strategic Plan II, 2005/6–2009/10, Human Resources for Health*. Kampala: MOH. Page 51.

interventions. The number of people reached by each intervention is the basis for identifying a gap in existing capacity to meet HIV-related strategic goals.

Methodology of the Capacity Module

The Capacity Module estimates human resource requirements for each HIV intervention for which inputs are made. Countries can determine if they would like to estimate staffing requirements for all the interventions which they currently provide or focus on key interventions, such as ARV therapy, prevention of mother-to-child transmission, and counseling and testing, which tend to consume the bulk of staffing requirements of the public sector. Irrespective of the number of interventions chosen, there are four specific types of inputs needed to run the Capacity Module:

1. Number of persons needing to be reached by type of intervention for the period under consideration, usually the period of a strategic plan
2. Base year capacity of existing trained personnel for each intervention for which staffing needs are being projected
3. Number of persons who can be reached by a single, full-time equivalent trained worker
4. Characteristics of trained personnel including attrition rates, sick and death rates, proportion needing various kinds of training in order to provide services, and proportion of time spent on the HIV program—all of which affect the availability of trained providers in the future

The Capacity Module works under the assumption that the maximum number of persons who could be reached by a trained provider is constrained by a complex of factors that reduce availability of workers. These include working hours of each cadre; proportion of these working hours spent exclusively on the HIV intervention; and a combination of local efficiencies, including the way patients are scheduled, distribution of HR resources within a facility, whether protocols are followed, and physical space and infrastructure that may either enhance or lower individual-level productivity. The Capacity Module makes no assumptions about whether the “number reached” is optimum, since local conditions that impact productivity vary greatly. Therefore, the only way to increase the numbers reached is to increase the number of staff permitted by guidelines to provide services. Policymakers can use the findings to determine whether they will try to increase the productivity of workers or try to task shift some of the work to different cadres, currently in larger supply, or to simply increase the number of cadres with the productivity levels as given.

The module can address the following questions:

- How many personnel are needed to provide the required services to achieve the country targets?
- How many staff must be trained to meet the personnel needs?
- How much funding is needed to meet the training needs?
- What is the gap in human resources?
- What operational policy changes might be necessary to achieve country targets? (e.g., Are regulations needed to allow nurses or clinical officers to dispense drugs? Do more physicians need to be retained in the public sector? Do national physicians need to be drawn from overseas posts?) Operational policies are guidelines, laws, regulations, codes, plans, and resource allocations that govern how services are provided, as well as the demand and access to those services. Guidelines on service provision are usually developed by professional/clinical bodies that may also be responsible for accreditation of facilities and staff. Staffing shortfalls, however, are usually experienced at the facility level by clients and providers. Facilities typically resort to forms of informal task shifting to cope with lack of the cadre or number of mandated providers. They resort to informal task shifting because of the lack of policy guidance or the presence of specific guidance that restricts which cadre of workers can provide specific services. The staffing needs module provides planners and professional bodies at the national level with a comprehensive picture of the gap that providers currently experience and opens opportunities to discuss sensitive issues like task shifting and any inefficiencies in the health system.

What Are the Staffing Needs to Expand ART?

The Capacity Module estimates the staffing needs to meet national targets for an entire package of HIV treatment and care services. In this application of the module, planners were interested in using the module to understand the human resource needs for one major intervention: scaling up ART in Uganda. ART is possibly the most physician-intensive intervention among the range of HIV interventions and most likely to yield opportunities for task shifting; it is also the primary area where both formal and informal task shifting appears to be occurring in Uganda.

Methodology

In late 2006/early 2007, the Uganda Bureau of Statistics and Ugandan National Strategic Plan Steering Committee asked the Health Policy Initiative to use the Goals Model and the Resource Needs Model (RNM)—an Excel-based tool used to calculate the total resources needed for HIV prevention and care—to examine current levels of funding, resources available, costing elements of the strategic plan, and various future funding scenarios and their potential impact. The steering committee decided to use a medium funding scenario where funding increases to US\$360 million by 2011/12 (i.e., double the level of funding from 2006) (see Table 1).⁶ The \$360 million covers all HIV interventions including ART. This level of funding allowed the committee to prioritize its efforts: scaling up the most cost-effective prevention interventions; achieving the most rapid expansion of ART coverage possible within the funding limits; and tripling resources for support of orphans and vulnerable children. With this information, it was possible to determine how many people could be reached with the current resource allocation to scale up ART each year. The current reach of each trained provider by cadre determines the number of personnel needing training to reach the strategic targets.

Table 1. Number of People Reached with ART Based on a Budget of \$360 Million by 2011/12

	2006	2007	2008	2009	2010	2011
ART	73,483	118,938	173,161	237,849	315,634	410,363

The numbers to be reached with ART provide the basis for estimating gaps by cadre of health workers. For the Capacity Module application, data were collected on base year capacity for the ART intervention and current characteristics of healthcare staff—including sick time, attrition, and death rates—to develop a more accurate estimate of the full-time equivalent personnel available to provide services. The Health Policy Initiative examined national guidelines and the stated optimal level of staffing in facilities and categories of providers to obtain the cadres required for ART. The guidelines mandate that only certain categories of trained providers including medical officers, clinical officers, nurses, laboratory technicians, and counselors can provide ART services. In addition, the project developed estimates of the number of clients *reached* by a full-time equivalent given the amount of time spent on the ART program and the number of hours worked.

Two recent studies in Uganda provided estimates on the time spent on ART alone:

1. Patterns of Care in Two HIV Continuity clinics in Uganda, Africa: A Time-Motion Study⁷
2. Potential Impact of Task Shifting on Costs of Antiretroviral Therapy and Physician Supply in Uganda⁸

The first study estimated the number of hours an average physician in an ART clinic works per day and was used to build estimates of time spent by nurses and clinical officers. That is, the Health Policy

⁶ Stover, J. et al. *Resources Required to Achieve the Goals of the National Strategic Plan (NSP) 2007/8–2011/12*. Kampala: MOH.

⁷ Were, M.C., J. M. Sutherland, M. Bwana, J. Ssali, N. Emenyonu, and W. M. Tierney. 2006. “Patterns of Care in Two HIV Continuity Clinics in Uganda, Africa: A Time-Motion Study.” *AIDS Care* 20(6): 677–682.

⁸ Babigumira, Joseph B. 2009. “Potential Impact of Task Shifting on Costs of Antiretroviral Therapy and Physician Supply in Uganda.” *BMC Health Services Research* 9.

Initiative used information on the numbers of hours the average physician worked and assumed that clinical officers worked on average one hour longer per day and nurses worked the same hours as well. The value in using this study as opposed to asking providers how much time they spend in clinical services, is that providers were actually observed “*in-situ*.” According to this study, doctors spent on average between 4.9 and 5.5 hours per day working in the HIV program, providing both direct and indirect patient care. Working hours of clinics studied also varied, which acts as a constraint on the maximum number of working hours a clinician can provide. This study provided the only available data on how many hours of time were actually spent providing HIV services. More efficient clinics could be open for longer hours and have their clinicians working a greater proportion of their time in the HIV program. For the purposes of this study, the Health Policy Initiative aimed to reflect existing working patterns as observed in two large HIV clinics but, in doing so, assumed this pattern as a given. The first study explicitly identifies that current practice does not maximize worker productivity. By taking the existing pattern as a given, this study would overestimate the numbers of personnel needed if productivity changes are made in Uganda in staffing HIV clinics.

The second study estimated program reach according to category of provider. In other words, the following was calculated: how many clients a provider could see on average given the amount of hours worked, the amount of time spent with a patient per visit, and the number of visits made by a patient per year assuming that all patients followed recommended protocols. The study estimated that, on average, based on clinical observation, a doctor spends 0.14 hrs (8.4 minutes) per patient per visit on ART and sees this patient 12 times or 12 visits per year.⁹ Nurses and lab techs also see the same patients 12 times per year and spend different amounts of time per visit per patient. The study also looked at the mean time spent in the clinic by physicians and the amount of time spent in clinical and non-clinical activities. An important finding was that while the average duration of a patient visit ranged from more than one hour to more than three hours, most of the time was spent waiting to be seen by different categories of health providers.

The Base Year Capacity of ART providers was obtained from several sources, including the Service Provision Assessment 2007, for all staff categories. In general, this information may be available from the National AIDS Council or the Department of Human Resources within the MOH. In this application, the Health Policy Initiative estimated the number of trained providers. To estimate what proportion are actually trained in ART and exist in the labor pool in Uganda, the project assumed that the pool is restricted to the number of people who work in accredited facilities. In 2006, there were 205 accredited ART sites. This assumption seemed reasonable based on the low level of movement from the public sector to elsewhere and the attrition by doctors to employment overseas, not to non-health employment in general. This is different from most other countries but has been shown in several studies in Uganda. In addition, a study led by the Infectious Disease Institute (IDI) estimated the proportion, by cadre, actually trained to initiate ART among other interventions. The proportion trained to initiate ART was used as the baseline for trained health providers.

Estimates of attrition, sick time, and death rates, as well as estimates of training costs and numbers by type of training, were also made based on available published data. Information on types of training and costs of such programs were obtained from data published in a 2006 study by The AIDS Support Organization (TASO), Family Health International (FHI), and the Population Council.¹⁰ This information was then used to project costs of training workers needed to reach clients on ART from 2007–2010. Wage data were obtained from three sources: a comprehensive review of human resources for health in Uganda, a published salary scale from the MOH’s Division of Public Administration, and the provider and task-shifting study described earlier, which provided daily rates by cadre involved in ART.

⁹ For a similar methodology, see D.M. Moore, F. Kaharuza, J. Homsy, D. Bangsbert, and R.S. Hogg. 2007. *Health Human Resource Capacity is a Constraint to the Expansion of HIV Care and Treatment Programs in Uganda*. Entebbe: Uganda CDC and Uganda Virus Research Institute.

¹⁰ TASO, FHI, and Population Council. 2006. *Cost of Training Programs and Willingness to Pay for Training: An Application of Break-Even Analysis in Uganda*. Washington, DC: Population Council.

Findings

Using the Capacity Module and data from the two studies cited above, from TASO on training costs, from a national survey on training needs for ART, from the Service Provision Assessment as well as salary and education costs from the Ministry of Health, the Health Policy Initiative estimated the existing capacity in Uganda for ART interventions. Capacity was based on number of staff trained in ART in 2006 and adjusted for attrition and newly trained staff. Table 2 shows that over five years, existing capacity for ART is expected to grow, with the largest increases anticipated in nursing staff. Existing capacity after the base year equals existing capacity minus losses from attrition and deaths and includes the numbers newly trained and entering the service. In this way, existing capacity is expected to grow, based on assumptions on numbers who are trained through pre-service and in-service to provide ART.

Table 2. Existing Capacity for ART

	2006	2007	2008	2009	2010	2011
Physicians	67	184	257	380	507	671
Clinical officers	66	163	242	351	475	627
Nurses	176	291	467	656	893	1,291
Lab technicians	50	159	217	324	432	572

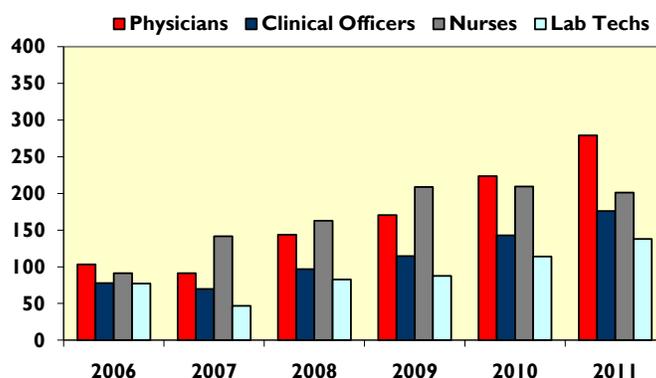
The module was then used to estimate the numbers of people requiring training by type of training in order to reach needed clients by 2011 for ART interventions alone (see Table 3). In Uganda, most providers require pre-service training prior to providing ART. In addition, in-service training is needed for existing providers, while continuing education is needed to update providers on guidelines and protocols and new information for treatment.

Table 3. Number of Providers Requiring Training by Type of Training

	2006	2007	2008	2009	2010	2011	Total
Number of people to be trained—pre-service	614	548	663	769	917	1,342	4,862
Number of people to be trained—in-service	295	220	322	372	432	665	2,305
Number of people to be trained—continuing education	477	771	945	1,297	1,686	2,239	7,414

However, each year, the required capacity to meet strategic goals also expands so that there is a growing gap between existing and required staffing needs for the *ART intervention alone* in Uganda (see Figure 1). Thus, even with investments in training, the Capacity Module projected a gap in staffing needs to meet required goals of expanding ART through 2011. The gaps show that in order to reach the strategic targets for ART, the number of trained staff will need to be increased and investments in productivity will need to occur.

Figure 1. Gap in Human Resources for Antiretroviral Therapy



Using the Capacity Module, the Health Policy Initiative determined for each year of the strategic plan the training required and the costs associated with pre-service, in-service, and continuing education. The total costs of training combining training costs by cadre (nurses, doctors, clinical officers, and laboratory personnel) and by type of training is given for each year of the strategic plan. The training costs rise from \$1.2 million to nearly \$4 million by 2011. While these costs may seem like a large investment for ART readiness, training costs per client reached over the five-year period are modest and decline from \$17 in 2006 to \$9 by 2011. This is because the proportion of staff requiring pre-service training of the total requiring training drops from 44 percent to 32 percent, while the proportion already trained needing continuing education rises from 34 percent to 53 percent of all training costs incurred. Pre-service training is estimated to cost \$1,600 per person per workshop for nurses, doctors, and clinical officers; and \$900 for laboratory technicians. The costs of scaling up ART in Uganda as estimated by the Capacity Module were compared with other efforts to estimate resource needs. A 2005 study, on resources needed to scale up ART, estimated that costs for training would rise from \$2.2 million in 2006 to \$2.7 million in 2011, representing 3 percent of total costs for scale-up. This study used different methodology to evaluate training costs for ART. Total training costs were based on national guidelines on minimum staffing at various facility levels mandated to provide ART in Uganda. The Capacity Module calculates training costs based on program outputs needed and, in this way, allow for a better understanding of what scale-up in HIV/AIDS will imply. The costs associated with all types of training are illustrated in Table 4.

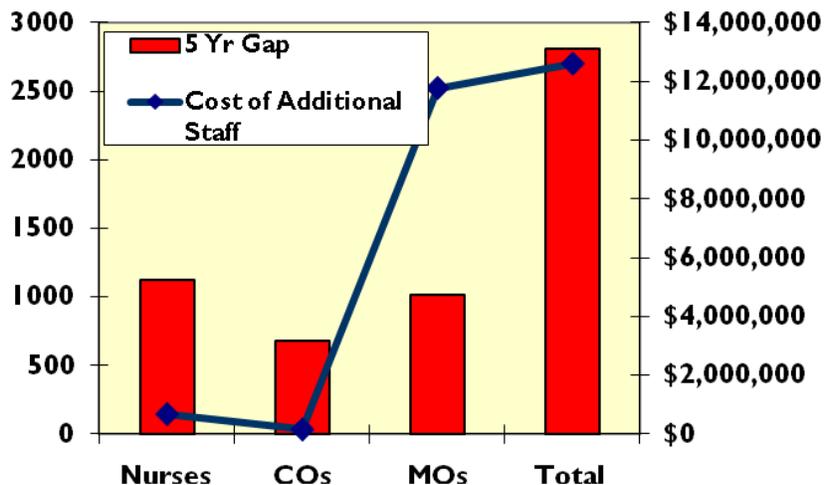
Table 4. ART Training Costs (US\$)
Pre-service, in-service, and continuing education

	2006	2007	2008	2009	2010	2011
Total workshop costs*	\$ 1,213,717	\$1,242,538	\$1,801,605	\$2,173,505	\$ 2,621,681	\$ 3,771,748

Source: TASO Training Centre, Uganda, for ART and laboratory training costs

In addition to these workshop costs, the Health Policy Initiative also examined the costs of producing different categories of ART providers in Uganda. Figure 2 provides an overview of the costs of educating new providers by cadre. If staffing gaps can be managed in some measure with a greater role for clinical officers and nurses, the costs of overall training, which includes education and time to produce a fully trained provider, will be substantially lower.

Figure 2. The Cost of Education to Fill the Gap in ART Capacity by Cadre



Source: A review of HR for Health in Uganda (2003)¹¹
Note: CO = Chief officer; MO = Medical officer

¹¹ Matsiko, C.W., Kiwanuka, J. 2003. *A Review of Human Resources for Health in Uganda*.

Summary and Recommendations

In February 2010, the findings of the Capacity Module were shared with ministers of health in the ECSA region in Kampala, Uganda. The purpose of the presentation was to demonstrate the value of considering human resource requirements at the time of developing national strategic targets for HIV/AIDS. Human resource needs are usually not considered while developing strategic plans but can become the stumbling block to plans for rapid scale-up of prevention and treatment. In the short term, this information about human resources and costs can help planners in Uganda to identify alternative staffing structures, shift non-specialized tasks to other personnel when there are limited specialized staff, and identify other underutilized qualified personnel. In addition, this type of information can help to improve performance in terms of time allocation for ART. As seen earlier, the determination on staffing requirements depends on existing structures that may not be optimal for productivity and quality of care. Hence, the gap in required capacity to meet targets could be met by increasing the number of hours spent in the clinical program, increasing working hours of clinics, or finding efficiencies in the way clients are scheduled for services. Task shifting is occurring in Uganda through both experimental and informal mechanisms where higher-level workers are unavailable and should be considered on a national scale to lower costs and address time constraints implicit in reaching a large number of patients. In this regard, Uganda's IDI has been piloting an innovative task-shifting model in ART, providing a useful model for the scale-up of services.¹² As Uganda prepares for the next round of strategic planning in HIV/AIDS, updating this Capacity Module application with new data and new targets can provide valuable information on human resource needs associated with the scale-up. Since the Capacity Module is linked to the Goals Model, this can provide Uganda with information about human resource requirements related to budgets and resource allocation decisions. In addition, the linked models can provide another useful lens through which to view the feasibility of national plans to scale up HIV/AIDS programs, since resource allocation choices among prevention and treatment interventions affect the number of people reached and prevalence and can be useful to determine the number and type of health personnel needed to “reach” clients.

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